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(71) Applicant  
Smiths Industries Public Limited Company  
(Incorporated in United Kingdom)  
765 Finchley Road, London, NW11 8DS

(72) Inventor  
Roderick William McLeod

(74) Agent and/or Address for Service  
J. M. Flint  
765 Finchley Road, London, NW11 8DS

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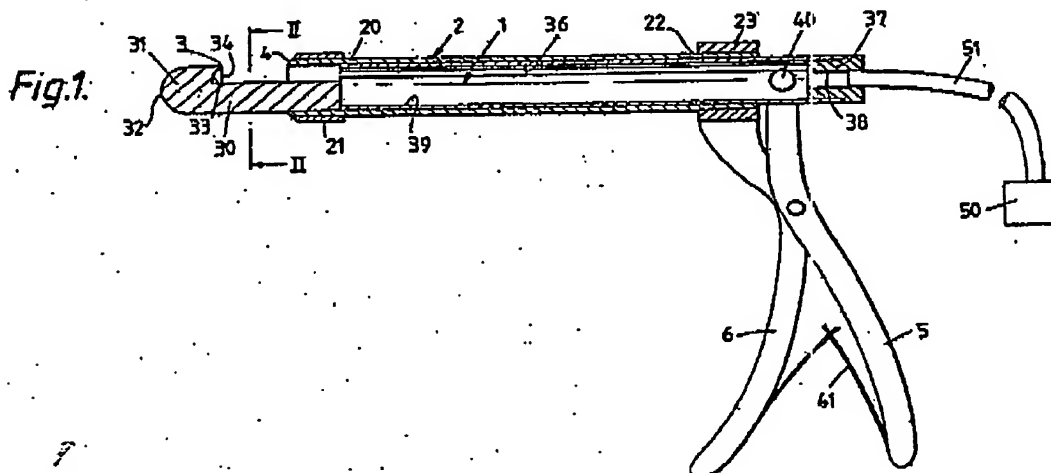
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## (54) Surgical Instruments

(57) A Rongeur for the removal of intervertebral disc material has an outer tubular jaw (2) the forward end (20) of which provides a biting surface (4), an inner jaw (1) which is slidable along the outer jaw, projects from its forward end and has a rearwardly directed circular cutting edge (34) which cooperates with the biting surface (4) of the outer jaw (2). At their rear ends, the jaws (1 and 2) are coupled e.g. by handles (5 and 6) so that the disc material can be severed by closing the cutting edge (34) about the biting surface (4). Severed material is removed by suction through a passage along the Rongeur which can be formed by a hollow inner jaw (1) or by a space between the inner and outer jaws.



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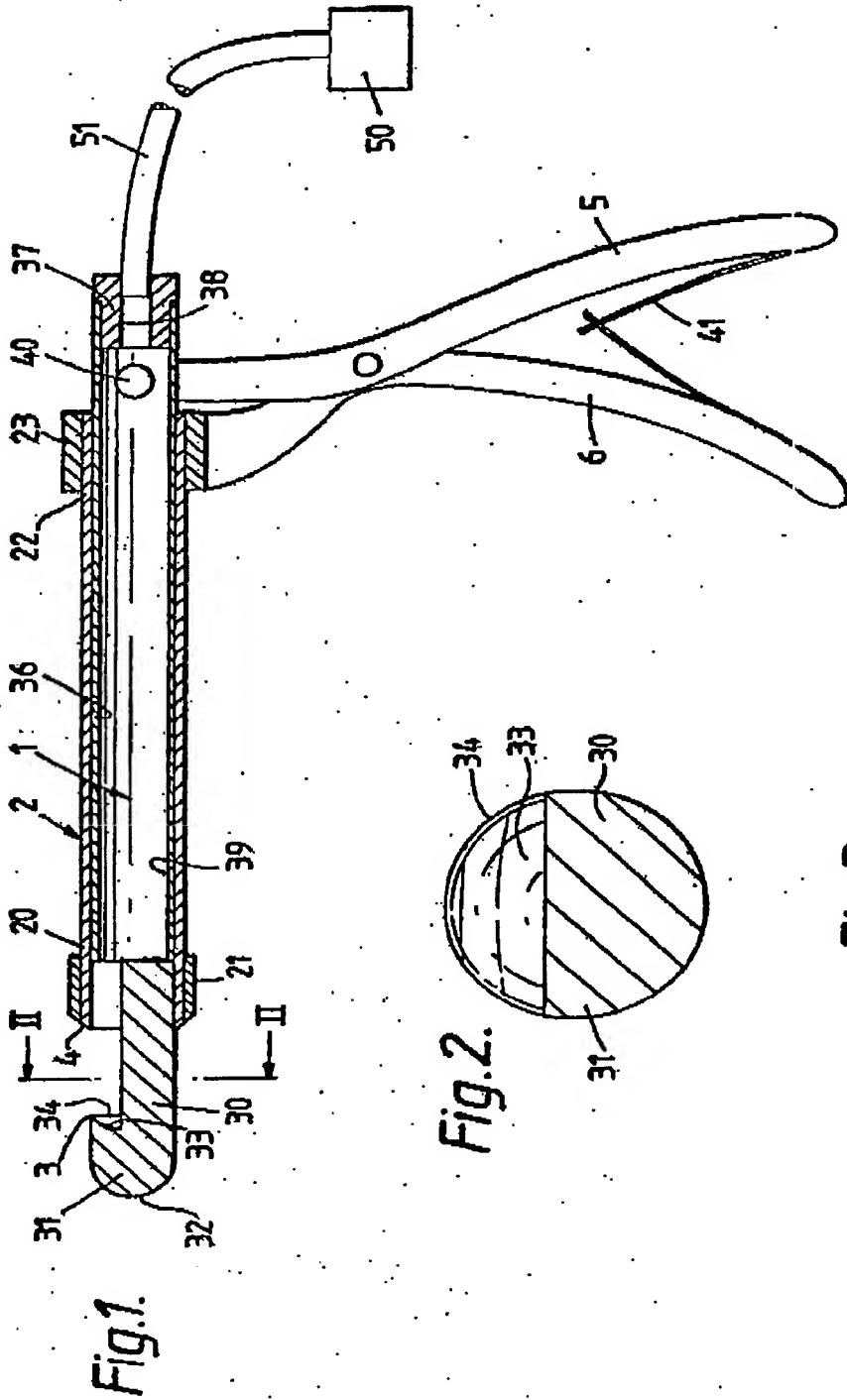
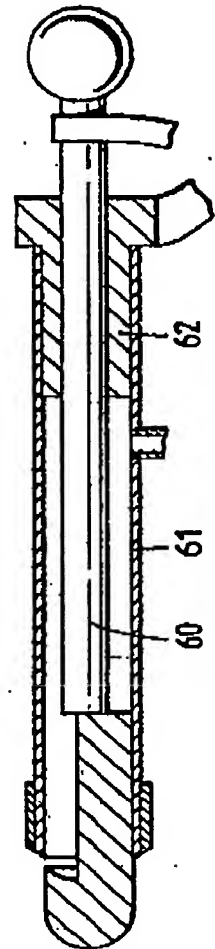


Fig. 3.



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SURGICAL INSTRUMENTS

This invention relates to surgical instruments.

The invention is more particularly concerned with surgical instruments for cutting and removing tough body material such as fibrocartilaginous material, and more especially intervertebral disc material.

Neurosurgery involving removal of parts of intervertebral disc material commonly employs instruments such as a rongeur. These instruments take several forms but generally employ two solid, elongate sliding jaws mounted on top of one another and coupled to handles at their rear end. At their forward end, the lower jaw is bent upwards and provided with a biting surface which co-operates with a biting surface at the forward end of the upper jaw. By squeezing the handles together the top jaw is slid forwardly along its length relative to the lower jaw to bring the two biting surfaces to bear on opposite sides of any body material located between them.

These previous instruments have several difficulties. Because they are used to cut relatively tough material, the forces on the instruments can be high. In order to prevent buckling and distortion of the jaws they are formed with mating keyways to ensure close contact with each other along their entire length. The nature of the biting surfaces and the coupling with the handles generally necessitates the jaws being made as metal forgings, each jaw being different for different size instruments. This all leads to a relatively high cost of such instruments.

It is an object of the present invention to provide a surgical instrument for use in removal of tough body material which can be made accurately at reduced cost.

According to one aspect of the present invention there is provided a surgical instrument for use in removal of tough body material including first and second elongate members slidable relative to one another along their length, the first member being of generally tubular form and being provided with an open forward end which forms a first biting surface, the second member extending within the first member and projecting from the forward end of the first member, the second member having a second biting surface on a portion of the second member projecting from the first member that cooperates with the first biting surface so that tough body material between the first and second biting surfaces can be severed by displacing the first member forwardly relative to the second member, and the instrument having a passageway along it within the first member by which severed material can be removed by suction.

The first member is preferably of circular section and the first biting surface of curved shape. The forward end of the first member may be cut square and may have a reinforcing ring embracing the forward end of the first member.

The second member preferably has a solid bit at its forward end on which said second biting surface is provided, the rear end of the bit being joined to a separate member that extends through the first member. The forward end of the bit may be rounded and the biting surface on the bit may have a concave surface. The second member may have a tubular portion that

provides the passageway through which severed material can be removed by suction. Alternatively, the passageway is provided by a passageway between the first and second members.

The instrument may include two handles pivoted with one another, each handle being coupled with a respective one of the first and second members. The instrument may include resilient means acting to urge the first member rearwardly relative to the second member, the resilient means preferably being mounted between the handles and acting to urge the handles apart.

A Hangeur instrument in accordance with the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side elevation view of the instrument;

Figure 2 is a transverse enlarged section along the line II - II of Figure 1; and

Figure 3 is a side elevation view of a part of an alternative form of instrument.

With reference first to Figures 1 and 2, the Rongeur instrument includes two jaw members 1 and 2 with co-operating biting surfaces 3 and 4 at their forward ends. The jaws 1 and 2 are coupled to pivoted handles 5 and 6 at their rear end by operation of which the biting surfaces can be brought together to sever material between the biting surfaces.

The outer jaw 2 is in the form of a steel tube of circular section which is cut square at its forward end 20 and bevelled to provide an annular biting surface 4 around its entire periphery, although only a curved part of the periphery used for cutting. The biting surface 4 is reinforced by a ring 21 which embraces the end 20 of the jaw 2 and which is bevelled to provide a continuation of the biting surface 4 on the tube. At its rear end 22, the outer jaw 2 has a tubular bush 23 secured about its circumference by which the jaw is joined to the handle 6.

The inner jaw 1 extends within the outer jaw 2 as a close sliding fit and projects from the outer jaw at both ends. At its forward end 30, the inner jaw 1 has a solid steel bit 31. The bit 31 has a rounded, hemispherical tip 32 and is of circular section at its forward end. A short distance to the rear of the tip 32, the upper surface of the bit 31 is flattened and reduced in height to leave a section slightly greater than a semicircle and thereby form an upstanding wall 33 located forwardly of the forward end of the outer jaw 2. The wall 33 is undercut to a concave profile with its outer circular edge 34 providing a rearwardly directed cutting edge which forms the biting surface 3. The diameter of the forward end of the bit 31 is the same as the internal diameter of the outer jaw 2.

At its rear end, the bit 31 is joined to the forward end of a steel

tube 36 which extends along the outer jaw 2 as a close sliding fit. The forward end of the tube 36 opens at the forward of the instrument so that a passageway is provided along the instrument. The rear end of the inner jaw 1 is capped by a boss 37 having a bore 38 therethrough which opens to the bore 39 through the tube 36. The rear end of the inner jaw 1 also has a pivot coupling 40 by which the inner jaw is coupled to the handle 5.

A leaf spring arrangement 41 between the handles 5 and 6 urges them apart and the outer jaw 2 rearwardly relative to the inner jaw 1.

In use, with the handles 5 and 6 in their relaxed, natural position, the forward end of the instrument is manoeuvred so that an intervertebral disc is positioned between the biting surfaces 3 and 4 on the inner and outer jaws 1 and 2. The two handles 5 and 6 are then squeezed together, against the action of the spring 41, so that the outer jaw 2 is pushed forwardly, sliding along the inner jaw 1. This brings the biting surfaces 3 and 4 to bear against the intervertebral disc thereby punching or nibbling a piece from the disc. Some of the removed disc material may be pulled into the outer jaw 2 and this debris is removed continuously by means of a suction source 50 connected via a flexible line 51 to the boss 37.

The tubes from which the inner and outer jaws 1 and 2 are made can be cut from stock tubing at low cost, without the need to make dedicated forgings. The bit 31 of the inner jaw 1 may be machined from a rod and be identical for different size instruments. By forming one of the jaws as a tube in which the other jaw slides, good mechanical support is provided on all sides, without the need to provide sliding keyways in solid members.

as in previous instruments.

The instrument may take many different forms for different applications. For example, the inner jaw need not be tubular, but could be a solid rod 60, as shown in Figure 3. In order to enable suctioning of debris there must be some form of passageway along the Rongeur, such as by making the diameter of the rod 60 less than the internal diameter of the outer jaw 61 and supporting the rod at the rear end in a bush 62.



CLAIMS

1. A surgical instrument for use in the removal of tough body material including first and second elongate members slidable relative to one another along their length; wherein the first member is of generally tubular form and is provided with an open forward end which forms a first biting surface, wherein the second member extends within the first member and projects from the forward end of the first member, wherein the second member has a second biting surface on a portion of the second member projecting from the first member that cooperates with the first biting surface so that tough body material between the first and second biting surfaces can be severed by displacing the first member forwardly relative to the second member, and wherein the instrument has a passageway along it within the first member by which severed material can be removed by suction.
2. A surgical instrument according to Claim 1, wherein the first member is of circular section and the first biting surface is of curved shape.
3. A surgical instrument according to Claim 2, wherein the forward end of the first member is cut square.
4. A surgical instrument according to Claim 3, wherein the first member has a reinforcing ring embracing the forward end of the first member.

5. A surgical instrument according to any one of the preceding claims, wherein the second member has a solid bit at its forward end on which said second biting surface is provided and wherein the rear end of the bit is joined to a separate member that extends through the first member.
6. A surgical instrument according to Claim 5, wherein the forward end of said bit is rounded.
7. A surgical instrument according to Claim 5 or 6, wherein the biting surface on the bit has a concave surface.
8. A surgical instrument according to any one of the preceding claims, wherein the second member has a tubular portion that provides said passageway through which severed material can be removed by suction.
9. A surgical instrument according to any one of Claims 1 to 7, wherein the said passageway is provided by a passageway between the said first and second members.
10. A surgical instrument according to any one of the preceding claims, including two handles pivoted with one another, and wherein each handle is coupled with a respective one of the first and second members.
11. A surgical instrument according to any one of the preceding claims, including resilient means acting to urge the first member

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rearwardly relative to the second member.

12. A surgical instrument according to Claim 10 and 11, wherein the resilient means is mounted between the handles and acts to urge the handles apart.
13. A surgical instrument substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.
14. A surgical instrument substantially as hereinbefore described with reference to Figures 1 and 2 as modified by Figure 3 of the accompanying drawings.
15. Any novel feature or combination of features as hereinbefore described.

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